1) If $\ln 4 = x$ and $\ln 3 = y$, then in terms of x and y, $\log_{\sqrt{3}} 18 =$

A) $\dfrac{x + 4y}{y}$

B) $\dfrac{x + 2y}{y^2}$

C) $\dfrac{x + 2y}{2y}$

D) $\dfrac{x + 4y}{2\sqrt{y}}$

E) $\dfrac{2x + 2y}{y}$

2) If $A = \log_2 8$ and $B = (\log_3 \sqrt{2}) \cdot (\log_{\sqrt{2}} 8)$, then $A^B =$

A) 8

B) 3

C) $\sqrt{2}$

D) 4

E) 2

3) The solution set of the equation $\sqrt{\log_2 x} = -\log_2 \sqrt{x}$ contains

A) one positive integer only

B) one positive and one negative integers

C) no real numbers

D) two positive integers

E) one negative integer only

4) If $x, y > 0$ then $-\log_3 x - \log_9 4y^2 + \log_{\sqrt{3}} xy =$

A) $\log_3\left(\frac{xy}{2}\right)$

B) $\log_3\left(\frac{2}{xy^2}\right)$

C) $\log_3\left(\frac{2x}{y^2}\right)$

D) $\log_3\left(\frac{x^2}{2y}\right)$

E) $\log_3\left(\frac{2x^2}{y^2}\right)$

5) Which one of the following statements is FALSE about the graph of the function $f(x) = \log|2x - 1|$?

A) the graph is increasing on the interval $(-\infty, \frac{1}{2})$

B) the graph has a vertical asymptote at $x = \frac{1}{2}$

C) the graph is below the x-axis in the interval $(0, \frac{1}{2}) \cup (\frac{1}{2}, 1)$

D) the graph has x-intercepts at $x = 0$ and $x = 1$

E) the graph has the domain $(-\infty, \frac{1}{2}) \cup (\frac{1}{2}, \infty)$

6) If $f(x) = \frac{1}{x+2}$, $x \neq -2$ and $f^{-1}(x) = \frac{b+ax}{x}$, then $a + b =$

A) -1

B) $\frac{1}{2}$

C) 4

D) 2

E) 0

7) The sum of all the solutions of the equation $4^x - 6(2^x) + 8 = 0$ is:

A) 3

B) $\frac{7}{2}$

C) $\frac{3}{2}$

D) 5

E) 2

8) If $f(x) = x^2 + 2$; $x < 0$, then $(f^{-1} \circ f)(-1) + f^{-1}(6) =$

A) -3

B) 3

C) $\sqrt{5}$

D) $2\sqrt{3}$

E) 9

9) If α is the supplementary angle of $23°15'$ and β is the smallest positive coterminal angle of $-582°$, then $\alpha + \beta =$

A) $294°45'$

B) $295°5'$

C) $284°45'$

D) $290°35'$

E) $292°45'$

10) A tire rotates 240 times per minute. Through how many degrees does a point on the edge of the tire move in 1/2 second ?

A) $720°$

B) $1040°$

C) $1440°$

D) $180°$

E) $360°$

11) The point $(-4, y)$ lies on the terminal side of an angle θ in standard position. If $\sin\theta = -\frac{2}{3}$, then the value of y is :

A) $-\frac{8\sqrt{5}}{5}$

B) $-\frac{4\sqrt{5}}{5}$

C) 12

D) $\frac{2\sqrt{5}}{9}$

E) $-\frac{\sqrt{5}}{18}$

12) If the terminal side of the angle θ lies on the line $2x + 3y = 0$ and $x \le 0$ then the value of $\sec\theta + \csc\theta$ is equal to:

A) $\frac{\sqrt{13}}{6}$

B) $\frac{5\sqrt{13}}{6}$

C) $-\frac{5\sqrt{13}}{6}$

D) $-\frac{\sqrt{13}}{6}$

E) $\frac{2}{3}$

13) The reference angle α', in **radians**, of the angle $\alpha = 920^\circ$ is equal to:

A) $\frac{\pi}{9}$

B) $\frac{\pi}{3}$

C) $\frac{\pi}{5}$

D) $\frac{\pi}{10}$

E) $\frac{\pi}{6}$

14) If $(a, 0)$ is the x-intercept and $(0, b)$ is the y-intercept of the graph of the function $f(x) = -2^{-x+2} + 8$, then $b - a =$

A) 5

B) 0

C) -3

D) 3

E) -4

15) Suppose that you stand in front of a 240 meters high building. If the angle of elevation to the top of the building is $\frac{\pi}{3}$, how far are you from the base of the building?

A) $80\sqrt{3}$ meters

B) $240\sqrt{3}$ meters

C) $20\sqrt{3}$ meters

D) $\frac{80\sqrt{3}}{3}$ meters

E) $60\sqrt{3}$ meters

16) If a 135° central angle intercepts a 6π centimeters arclength on a circle of radius r, then r =

A) 8 cm

B) 10 cm

C) 12 cm

D) 6 cm

E) 16 cm

17) In the figure below, $\frac{\sqrt{6}yz}{w}$ =

A) 12

B) 8

C) 14

D) 10

E) 20

18) If $\left[\sqrt[3]{5}\right]^{-x} = \left[\frac{1}{5}\right]^{x-2}$, then $2x - 1$ =

A) 5

B) $\frac{1}{3}$

C) - 5

D) - 1

E) $-\frac{1}{3}$

19) $2\cos(570^\circ)\cdot\csc(-630^\circ)\cdot\cot(-120^\circ) =$

A) -1

B) 1

C) $\frac{1}{2}$

D) $-\frac{1}{2}$

E) $\sqrt{3}$

20) The figure below, represents the graph of the function

A) $f(x) = 3 - 2^{-x}$

B) $f(x) = 3 - 3^{-x}$

C) $f(x) = -3 + 2^{x}$

D) $f(x) = 3 + 3^{-x}$

E) $f(x) = 3 + 2^{-x}$